From HCI and Affective Computing to Sentiment Analysis: extending the pool of context-aware features in Affective-aware systems

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1. Introduction

One of the main challenges of recent years is to create Affective-aware Human Computer Interaction (HCI) systems and context-aware Affective Computing (AC) systems. But, what does it mean to create or advance such systems when incorporating context features and which should be the most appropriate type of such context features? Even though a number of studies have analyzed how different features, when incorporated into AC systems and particular into Sentiment Analysis (SA) systems, improve their performance; a complete picture of their effectiveness remains unexplored. So far, a wide range of context-aware features has been independently tested by a large number of research teams, mostly in constrained settings (Beineke et al. 2004, Pang et al. 2004, Pang et al. 2002, Turney 2002). Nevertheless, there is not a clear picture of the impact of every feature set and there is little to no evidence regarding how the combination of such context-aware features behaves with different in size and genre of information sources. In light of these observations, we attempt to extend the pool of the context-aware sentence features used into context-aware SA and to further provide the foundations for a comprehensive analysis of the relative importance of the various types of contextual features.

2 Objectives

Positioned in the cross-section of the research areas of Interaction Context, SA and AC, our goal is a) to get the most informative context-aware features by applying the Conditional Random Field (CRF) and the Rhetorical Structure Theory (RST) methods (Lafferty et al. 2001, Mann et al. 1988), b) to incorporate this feature set into two different in size and genre datasets, c) to explore how each set of features we use, behaves against these two datasets and finally d) to extend and enrich the observed tendencies from unimodal SA (current) to multimodal AC systems (future research)).

3 Methods

The data for this study come from the Movie Review Dataset (MR) (Pang et al. 2004) and the Finegrained Sentiment Dataset (FSD) (Tackstrom et al. 2011). We use these datasets to evaluate the analysis performance. We further propose the use of the following set of context-aware features which includes: a) Vocabulary features, b) Length features (Wiebe et al. 2005), c) Sentiment carrying words, d) Positional features, e) Context-aware RST and f) All features (All features combined together).

4 Results

We used the above datasets to evaluate the analysis performance. We experimented with the linear classifiers of the Liblinear Library, which supports classification by means of Support Vector Machines (SVMs) and Logistic Regression (LR). We extensively tested these classifiers against the training collection to select the best classifier. To optimize the classifiers, we used 5-fold cross-validation against the training data. For each collection, we further validated with the test set, the classifier that performed the best at training time. Our results indicate that, there is a significant number of interesting tendencies, suggesting that the amount, the type of the analyzed data, combined with a more extended number of contextual features, are of crucial importance for making Affective systems more context-aware. A detailed description of our findings will be discussed at the conference.

5 Conclusions

Technology has the potential to investigate how to tackle the issues of context awareness of HCI analysis and to progress towards real-world context-aware Affect and Sentiment analysis. Thus, in this research, we provide a set of context-aware features for context-aware SA systems, which we incorporate into two different in size and

genre datasets, by using the CRF and the RST methods and finally, we discuss in depth a number of interesting tendencies we observed.